Isolation Power Transformers

UI5 Platform SMD

- *3W LLC SiC Transformer*
- *Reinforced insulation, 10mm creepage & 7mm clearance*[3]
- *4200Vrms Hi-Pot isolation voltage*
- *Up to 1250Vpk rated voltage*[4]
- *Footprint: 17.2 x 11x 8.5 mm MAX*

Electrical Specifications @ 25°C – Operating Temperature -40°C to +125°C								
Part Number	Inductance (1-3) (uH ±40%)	Leakage Inductance (uH ±15%)	Capacitance (1,3) TO (6,4) (pF MAX)	DCR (1-3) (Ω MAX)	DCR (6-4) (Ω MAX)	E*T(1-3)[1] (V*uSec)	Turns Ratio ±3.0%	Hi-Pot Voltage (Vrms)
PHT7249NLT	44.55	1.4	2.5	0.12	0.20	17.8	1 : 1.67	4200

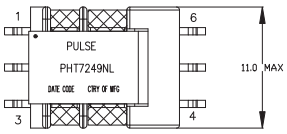
Notes:

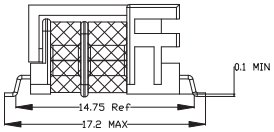
1. The E*T rating limits the peak flux density to 2100 gauss (flux swing 4200 gauss), when used in bipolar drive applications.
2. The applied ET may need to be further derated for higher frequencies based on the temperature rise which results from the core and copper losses
   A. To calculate total copper loss (W), use the following formula:
   Copper Loss (W)=Irms_Primary^{2}*DCR_Primary+Irms_Secondary^{2}*DCR_Secondary
   B. To calculate total core loss (W), use the following formula:
   Core Loss (W)=5.1E-12*f$^{1.7}$*(E*T/85)$^{2.79}$
   Where f is the working frequency in KHz, E*T is the voltage*times in V*uSecond, K1 is the Core Loss factor.
   C. To calculate temperature rise, use the following formula: Temperature Rise (°C) =125*(Core Loss(W)+Copper Loss (W))
3. Creepage and clearance is in accordance with IEC 61558-1 for reinforced insulation to a working voltage of 600Vms (for basic insulation to a working voltage of 1000Vms) based on material group I, pollution degree 2, OVC II and 3500m altitude.
4. Rated voltage is based on a positive partial discharge test (discharge < 10pC) for the profile shown in page 3, in accordance with IEC60664 for basic insulation.
   In an application which requires a reinforced insulation barrier, a rated voltage of 1000Vpk is defined and confirmed by partial discharge testing.

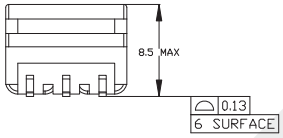
Mechanical

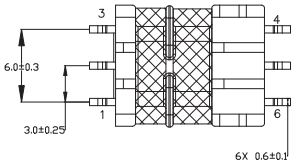
Schematic

PHT7249NLT

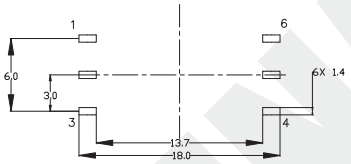




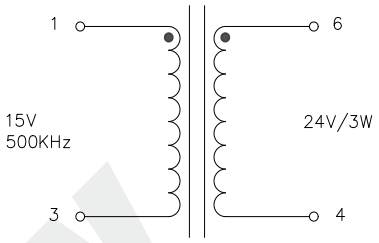




FINAL OUTLINE



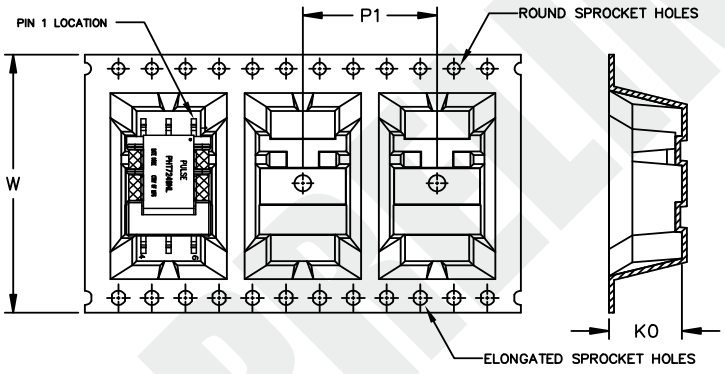
SUGGESTED LAND PATTERN

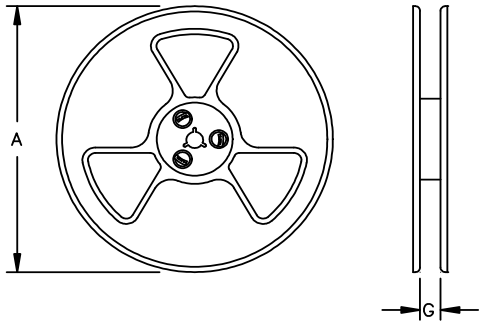


Weight 1.6grams

Dimensions: mm
Unless otherwise specified,
all tolerances are±0.25

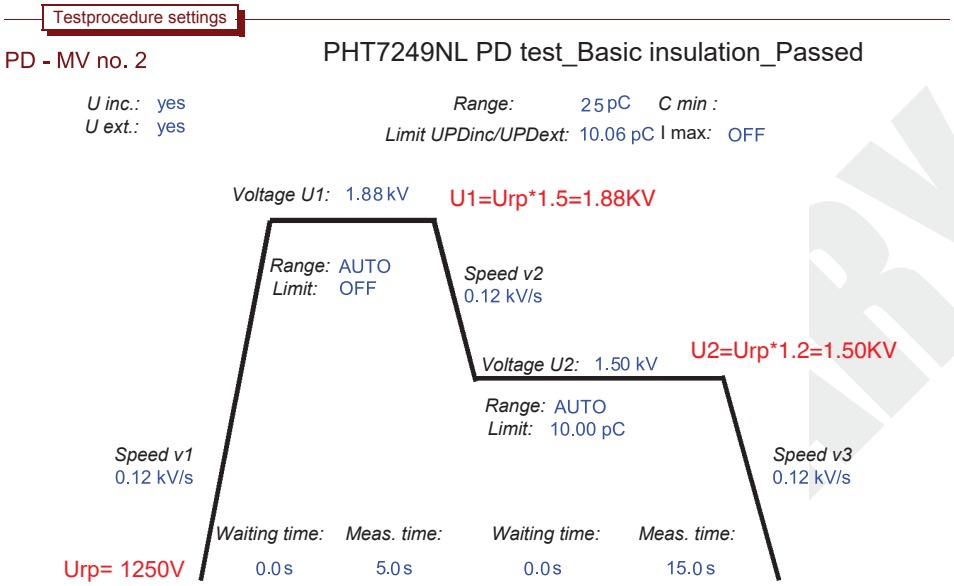
TAPE & REEL INFO

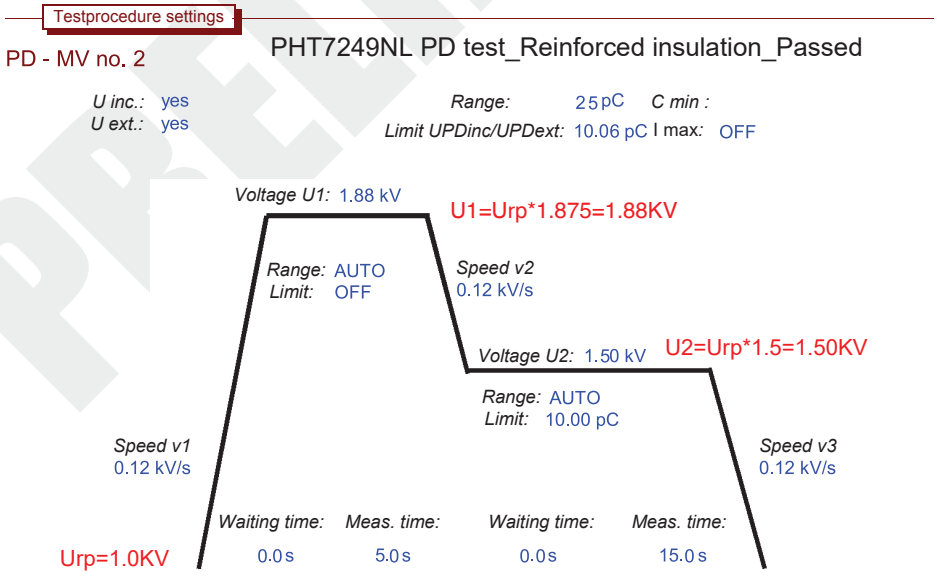




SURFACE MOUNTING TYPE, REEL/TAPE LIST						
PART NUMBER	REEL SIZE (mm)		TAPE SIZE (mm)			QTY
	A	G	P_1	W	K_0	PCS/REEL
PHT7249NLT	Ø330	32.4	16	32	8.7	350

Partial Discharge Test Profile





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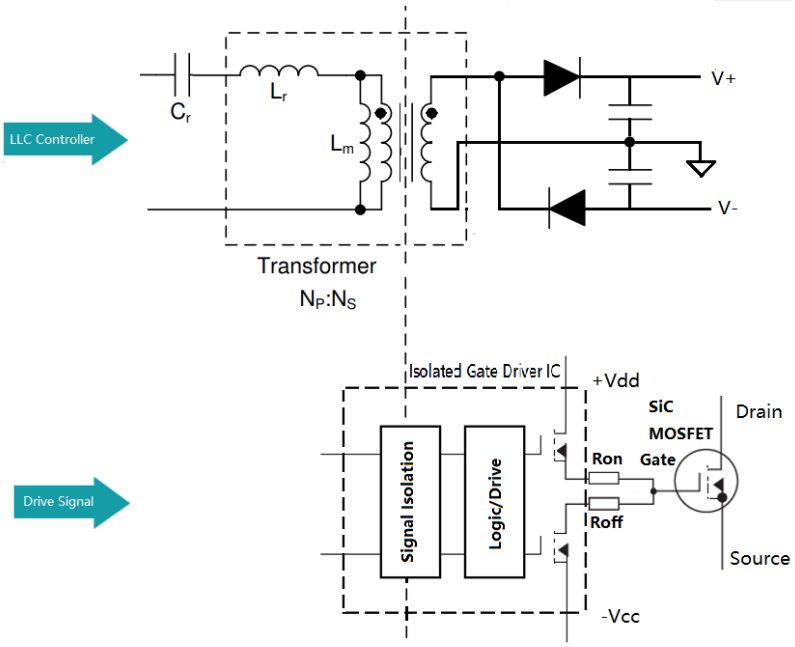
Application Note

Flyback and Push-Pull topologies have been widely used for MOSFET drive circuits. Tight coupling is necessary to minimise transformer leakage inductance, which enhances the efficiency of the drive circuit. However a tightly coupled transformer design results in relatively high interwinding capacitance, limiting higher switching frequency and the full utilisation of the benefits of using SiC Mosfets. Thus, it is difficult to simultaneously have low leakage inductance and low interwinding capacitance in a transformer.

This points to the significant benefit when using the LLC topology where a relatively high leakage inductance can be used as part of the resonant circuit, even replacing the need for an external resonant inductor. PHT7249NLT utilizes a two-section bobbin, which naturally minimizes the interwinding capacitance while the leakage inductance increases to a level which contributes to the resonant inductance. The low capacitance enables an order of magnitude reduction in the common-mode current injection through the bias transformer, making this solution ideal for high frequency switching SiC Mosfet drive circuits. The soft-switching feature further reduces the EMI noise.

The below circuit shows how the LLC transformer can be used to provide positive and negative voltages for SiC device switching. The voltage required across the gate-source terminals of a SiC MOSFET is typically in the range of 14 to 20 V for full turn-on and 0 to -5 V for robust turn-off. PHT7249NLT is suitable for this circuit and compatible with LLC controllers such as the TI UCC25800-Q1



In addition to the providing galvanic isolation between the high-voltage and low-voltage sides, the purpose of the transformer is to satisfy the requirements of the relevant safety standards. PHT7249NLT is designed to comply with the IEC61558-1 & -2/16 for basic and reinforced insulation. With 10mm creepage distance and based on material group I, OVCII and 3500m altitude, this corresponds to a maximum working voltage of 1000Vrms for basic insulation and 600Vrms for reinforced insulation. Contact your Pulse Electronics representative for other required output voltages and safety requirements.

For More Information:

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